IN THE SPECIFICATION

Please replace the paragraph beginning at page 2, line 25, with the following rewritten paragraph:

The present invention relates to a method for manufacturing a glass optical element comprising steps of:

molding a glass material softened by heat with a forming mold which comprises an upper mold and a lower mold, each having a molding surface so that optically functional surfaces are formed on the glass material by applying a molding pressure,

cooling the glass material so that the glass material obtains a predetermined viscosity, and

removing the cooled glass material from the forming mold,

wherein a temperature of the glass material is maintained, in the cooling step, within a range of (Tg+30) to (Tg-50) ~~degree~~ degrees centigrade at least for a predetermined time, and a secondary pressure is applied to the glass material at least during the predetermined time, so that the strain in the glass material is reduced,

where Tg represents glass transition temperature of the glass.

Please replace the paragraph beginning at page 4, line 18, with the following rewritten paragraph:

In the cooling step of the manufacturing method of the present invention, a temperature of the glass material is maintained within a range of (Tg+30) to (Tg-50) ~~degree~~ degrees centigrade at least for a predetermined time, and a secondary pressure is applied to the glass material at least during the predetermined time, whereby the strain in the glass material is reduced. That is, the glass material is subjected to post pressing in the cooling

step and internal distortion of the glass produced by cooling is alleviated by maintaining the glass within the prescribed temperature range.

Please replace the paragraph beginning at page 5, line 6, with the following rewritten paragraph:

In a preferred embodiment of the present invention, temperature variation of the glass material of which temperature is maintained in the cooling step is preferably 5 ~~degree~~ degrees centigrade per minute or less, and more preferably substantially null.

Please replace the paragraph beginning at page 5, line 11, with the following rewritten paragraph:

In another preferred embodiment of the present invention, in the cooling step, the temperature of the glass material is maintained within (Tg) to (Tg-50) ~~degree~~ degrees centigrade, preferably (Tg) to (Tg-20) ~~degree~~ degrees centigrade at least for the predetermined time and temperature variation of the glass material of which temperature is maintained in the cooling step is 5 ~~degree~~ degrees centigrade per minute or less.

Please replace the paragraph beginning at page 7, line 24, with the following rewritten paragraph:

Following press-molding at pressure P, pressing is continued at pressure P1 without ever completely removing pressure. Following the end of press-molding at pressure P, the forming mold is cooled (primary cooling). However, primary cooling may begin simultaneously with press-molding or during press-molding. Primary cooling can be conducted at a relatively rapid cooling rate generating internal distortion in the molded glass;

for example, 10 ~~degree~~ degrees centigrade/min or more, preferably 10-300 ~~degree~~ degrees centigrade/min, and still more preferably, 30-200 ~~degree~~ degrees centigrade/min.

Please replace the paragraph beginning at page 8, line 8, with the following rewritten paragraph:

Although pressures for pressure P1 and pressure P2 shown in Fig. 1 are different, they may be a single identical pressure. Further, the temperature during pressing at prescribed pressure P2 may be constant at t1, or may be gradually decreased from t1. The temperature during pressing at prescribed pressure P2 is conducted under conditions alleviating the internal distortion generated in the molded glass by the primary cooling. For example, cooling may be conducted at 0-5 ~~degree~~ degrees centigrade/min, preferably about 0 degree centigrade/min.

Please replace the paragraph beginning at page 8, line 17, with the following rewritten paragraph:

The temperature range that is maintained at least for a predetermined time runs from a temperature of 50 ~~degree~~ degrees centigrade below the glass transition temperature (Tg) of the glass optical element (Tg-50 ~~degree~~ degrees centigrade) to Tg+30 for the following reasons. This temperature range permits alleviation of internal distortion causing surface shape deterioration of the lens once the lens has been removed from the mold while maintaining the surface shape that has been obtained by transferal of the molding surfaces. Further, alleviation of internal distortion within the above temperature range inhibits the generation of new internal distortion during the subsequent step of cooling to the removal temperature.

Please replace the paragraph beginning at page 8, line 28, with the following rewritten paragraph:

The above-stated temperature range that is to be maintained is preferably (Tg-50 ~~degree~~ degrees centigrade) to Tg, and more preferably (Tg-20 ~~degree~~ degrees centigrade) to Tg. From the perspective of improving the final surface shape of the product, starting of the temperature maintenance is desirably at a point where the temperature of the molded glass material has dropped to Tg or below.

Please replace the paragraph beginning at page 9, line 4, with the following rewritten paragraph:

After being maintained within this temperature range for a prescribed period, the forming mold is further cooled. Once the molded glass has been cooled to a prescribed viscosity, a viscosity permitting the maintenance of a surface precision where there are not more than 0.8 irregularities, such as Tg-50 ~~degree~~ degrees centigrade or less, for example, to room temperature, the molded glass is removed from the mold. Post pressure P3 is continuously applied during the period running from maintenance of a prescribed temperature range through to removal. Pressure P3 may be identical to or different from P1 and P2.

Please replace the paragraph beginning at page 10, line 25, with the following rewritten paragraph:

After maintaining the above-stated temperature, the forming mold is further cooled (secondary cooling). When the molded glass reaches Tg or below, it is removed from the forming mold. The secondary cooling rate may be, for example, 10 ~~degree~~ degrees centigrade/min or more, preferably 10-300 ~~degree~~ degrees centigrade/min, and more preferably 30-200 ~~degree~~ degrees centigrade/min.

Please replace the paragraph beginning at page 12, line 3, with the following rewritten paragraph:

The glass lens (ratio *b/a*=3.5, oblate spherical lens) of the shape shown in Fig. 4, one surface of which was concave (radius of curvature R=4 mm) and the other surface of which was convex (radius of curvature R=38 mm) was manufactured. The concave surface was formed with the upper mold and the convex surface with the lower mold. LaC13 (Tg=520 ~~degree~~ degrees centigrade, Ts=560 ~~degree~~ degrees centigrade) was employed as the glass material.

IN THE CLAIM

Please amend the claims as follows:

1. (Currently amended) A method for manufacturing a glass optical element comprising ~~steps of~~:

molding a glass material softened by heat with a molding device which comprises an upper mold having a molding surface and a lower mold having a molding surface ~~so that optically functional surfaces are formed on the glass material~~ by applying a molding pressure to obtain a molded glass material;[[,]]

cooling the molded glass material ~~so that the glass material obtains a predetermined viscosity,~~; and

removing the ~~cooled~~ molded glass material from the molding device,

wherein a secondary pressure is continuously applied to the glass material following the application of the molding pressure, and a temperature of the molded glass material is maintained[[,]] for a period of time during ~~in~~ the cooling ~~step~~[[,]] within a range of (Tg+30) to (Tg-50) degrees ~~degree~~ centigrade ~~at least for a predetermined time, and a secondary pressure is applied to the glass material at least during the predetermined time,~~ so that [[the]] strain in the molded glass material is reduced, ~~where~~ Tg ~~represents~~ representing a glass transition temperature of the glass material, and

wherein temperature variation of the glass material during the period of time is at most 5 degrees centigrade per minute.

2. (Currently amended) The method of Claim 1, wherein the secondary pressure is ~~substantially~~ continuously applied ~~following the application of molding pressure and~~ up to the removing of the glass.

3. (Original) The method of Claim 2, wherein the secondary pressure is smaller than the molding pressure.

4. (Currently amended) The method of Claim 3, wherein the secondary pressure is set at pressure P1 before the beginning of the period of ~~predetermined~~ time and the secondary pressure is set at pressure P2 during the period of ~~predetermined~~ time, where P2 is greater than P1.

5. (Canceled)

6. (Currently amended) The method of Claim 2, wherein the temperature variation ~~of the glass material of which temperature is maintained in the cooling step~~ is substantially null.

7. (Currently amended) The method of Claim 2, wherein~~, in the cooling step,~~ the temperature of the glass material is maintained within a range of (Tg) to (Tg-50) ~~degree~~ degrees centigrade for the period of time during the cooling ~~at least for the predetermined time~~.

8. (Currently amended) The method of Claim 3, wherein~~, in the cooling step,~~ the temperature of the glass material is maintained within a range of (Tg) to (Tg-50) ~~degree~~ degrees centigrade for the period of time during the cooling ~~at least for the predetermined time~~.

9. (Currently amended) The method of Claim 8, wherein~~, in the cooling step,~~ the temperature of the glass material is maintained within a range of (Tg) to (Tg-20) ~~degree~~ degrees centigrade for the period of time during the cooling ~~at least for the predetermined time~~.

10. (Original) The method of Claim 2 wherein the secondary pressure is started to apply when a center thickness of the glass material is within ±0.2mm range of the glass optical element.

11. (Original) The method of Claim 3 wherein the molding pressure is within the range of 294×10^4 Pa to 3432×10^4 Pa, and the secondary pressure is within the range of 0.0098×10^4 Pa to 49×10^4 Pa.

12. (Canceled)

13. (Currently amended) The method of Claim [[12]] 3 wherein the glass optical element comprises at least one concave surface.

14. (Original) The method of Claim 13 wherein the glass optical element comprises one concave surface and one convex surface.

15. (Original) The method of Claim 14 wherein the convex surface comprises a spherical surface.

16. (Currently amended) The method of Claim 13 wherein b/a is at least 1.5 where a represents a center thickness of the glass optical element and b represents a ~~spherical~~ peripheral thickness of the glass optical element.

17. (Original) The method of Claim 16 wherein the b/a is at least 2.

18. (Currently amended) The method of Claim 2, wherein the period of ~~predetermined~~ time is determined by the following inequalities:

$0 < t_1 \leqq 120(\text{sec})$ when $1.5 \leqq b/a < 2.0$,

$20 < t_1 \leqq 180(\text{sec})$ when $2.0 \leqq b/a < 2.5$, and

$120(\text{sec}) < t_1$ when $2.5 \leqq b/a$,

where a represents a center thickness of the glass optical element

b represents a ~~spherical~~ peripheral thickness of the glass optical element,

and t_1 represents the period of ~~predetermined~~ time.

19. (Currently amended) The method of Claim 18, wherein the period of ~~predetermined~~ time is determined by the following inequalities:

$10 < t_1 \leqq 120(\text{sec})$ when $1.5 \leqq b/a < 2.0$,

$20 < t_1 \leqq 180(\text{sec})$ when $2.0 \leqq b/a < 2.5$, and

$120(\text{sec}) < t_1$ when $2.5 \leqq b/a$.

20. (Currently amended) The method of Claim 19, wherein the period of ~~predetermined~~ time is determined by the following inequalities:

$10 < t_1 \leqq 120(\text{sec})$ when $1.5 \leqq b/a < 2.0$,

$60 < t_1 \leqq 180(\text{sec})$ when $2.0 \leqq b/a < 2.5$, and

$120(\text{sec}) < t_1$ when $2.5 \leqq b/a$.

21. (Currently amended) The method of Claim 20, wherein the period of ~~predetermined~~ time is determined by the following inequality:

$120(\text{sec}) < t_1 \leqq 350(\text{sec})$ when $2.5 \leqq b/a$.

22. (Original) The method of Claim 3 wherein the glass material has two convex surfaces.

23. (Currently amended) The method of Claim 12, wherein the period of ~~predetermined~~ time and the maintained temperature are determined so that the irregularity in an optically functional surface of the optical element is 0.8 fringes or less in Newton rings.

24. (Original) The method of Claim 10 wherein the secondary pressure is started to apply when a center thickness of the glass material is within ±0.03mm range of the glass optical element.

25. (Currently amended) The method of Claim 23, wherein the period of ~~predetermined~~ time and the maintained temperature are determined so that the irregularity in an optically functional surface of the optical element is 0.5 fringes or less in Newton rings.

26. (New) The method of Claim 10, wherein the glass optical element is the double-concave lens.

27. (New) The method of Claim 2, wherein cooling of the molds is started simultaneously with the start of application of the molding pressure, during the application of the molding pressure, or upon completion of the application of molding pressure.

28. (New) The method of Claim 2, wherein cooling of the molds are started at an end of application of the molding pressure.

29. (New) The method of Claim 3, wherein the secondary pressure is set at pressure P1 before the beginning of the temperature maintenance, the secondary pressure is set at pressure P2 during the temperature maintenance, and the secondary pressure is set at pressure P3 after the temperature maintenance, wherein $P3 < P1 < P2$.

30. (New) The method of Claim 3, wherein primary cooling of the molds is carried out before the temperature maintenance and the secondary cooling of the molds is carried out after the temperature maintenance whereby a primary cooling rate and a secondary cooling rate are 30 degrees centigrade to 200 degrees centigrade per minute.

IN THE DRAWINGS

The attached sheets of drawings includes changes to Fig. 7 and required corrected drawing of Fig. 5. These sheets, which include Figs. 5 and 7, replace the original sheets including Figs. 5 and 7.

Attachment: Replacement Sheets (2)

REMARKS/ARGUMENTS

Favorable consideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-4, 6-11 and 13-30 are presently pending in this application, Claims 5 and 12 having been canceled, Claims 1, 2, 4, 6-9, 12, 13, 18-21, 23 and 25 having been amended, and Claims 26-30 having been added by the present amendment.

In the outstanding Office Action, Claims 1-3 were rejected under 35 U.S.C. 112, second paragraph; Claims 1, 2, 3, 4, 7, 8 and 9 were rejected under 35 U.S.C. 102(b) as being anticipated by Sato, et al. (U.S. Patent 5,228,894); Claim 22 was rejected under 35 U.S.C. 103(a) as being unpatentable over Sato, et al. in view of Tomisaka (U.S. Publicaion 2001-0039811); and Claims 2, 5, 7, 8, 9, and 12, the drawings and the specification were objected to because of informalities. However, Claims 5, 6, 10-21 and 23-25 were indicated as being allowable if rewritten in independent form. Applicants acknowledge with appreciation the indication that Claims 5-6, 10-21 and 23-25 include allowable subject matter.

In response to the objection to the drawings, submitted herewith is a separate LETTER SUBMITTING DRAWING SHEET(S), submitting for an approval change to Figure 7. Accordingly, the noted informalities have been corrected herewith.

Amended Claims 1, 2, 4, 6-9, 12, 13, 18-21, 23 and 25 are fully supported by the specification, drawings and claims as originally filed. For example, Claim 1 is supported by the present specification, [0012], [0013], [0015] and [0025]; Claim 26 is supported by the present specification, [0017]; Claim 27 is supported by the present specification, [0018]; Claim 28 is supported by the present specification, [0022]; Claim 29 is supported by Fig. 1; and Claim 30 is supported by the present specification, [0022] and [0032]. Applicants therefore submit that no new matter has been introduced.

In response to the objection to the specification and Claims 2, 5, 7, 8, 9 and 12, the specification and Claims 2, 7, 8, 9 and 12 have been amended to correct informalities. Claim 5 has been canceled. Accordingly, no further objection on that basis is anticipated.

In response to the rejection of Claims 1-3 under 35 U.S.C. 112, second paragraph, Claims 1 and 2 have been amended to recite the claimed subject matter in definite terms. Accordingly, Claims 1 and 2 are now believed to be in full compliance with the requirements of 35 U.S.C. 112, second paragraph. With respect to Claim 3, Applicants respectfully traverse the rejection under 35 U.S.C. 112, second paragraph. MPEP 2173.05(b) states:

> The fact that claim language, including terms of degree, may not be precise, does not automatically render the claim indefinite under 35 U.S.C. 112, second paragraph. *Seattle Box Co., v. Industrial Crating & Packing, Inc.*, 731 F.2d 818, 221 USPQ 568 (Fed. Cir. 1984). Acceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in light of the specification.

Claim 3 recites "the secondary pressure is smaller than the molding pressure" using a term "smaller". However, the meaning of "the secondary pressure is smaller than the molding pressure" is definite. One of ordinary skill in the art would understand what the term "smaller" means, even without referring to the specification. Therefore, the rejection of Claim 3 under 35 U.S.C. 112, second paragraph should be withdrawn.

If, however, the Examiner disagrees, the Examiner is invited to telephone the undersigned who will be happy to work in a joint effort to derive mutually satisfactory claim language.

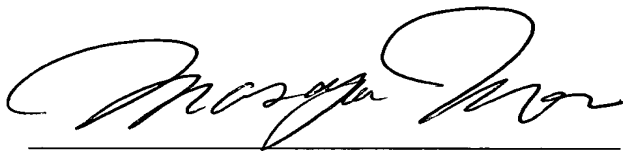
Amended Claim 1 includes subject matter recited in Claim 5, which was indicated as including allowable subject matter. Accordingly, Claim 1 is believed to be allowable.

Claims 2-4 and 6-11 and 13-30 depend directly or indirectly from Claim 1. Further, Claims 6, 10-21 and 23-25 were indicated as including allowable subject matter. Therefore, each of dependent claims is also believed to be allowable.

In view of the amendments, and in view of the indication of allowable subject matter, Applicants respectfully submit that the present application is in condition for allowance, and an early action favorable to that effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



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